

**Amendment to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (currently amended): An optical signal converter for converting signals at one frequency to signals at another frequency within a frequency grid, each adjacent pair of frequencies in said frequency grid separated by a predetermined amount, said optical signal converter comprising

a difference frequency generator receiving an energizing pump signal and an input signal at a first frequency and generating a converted signal at a second frequency from said input signal and said pump signal, said pump signal at a frequency such that said first and second frequencies are separated by an odd multiple of said predetermined amount and one-half of said pump frequency is between two frequencies of said frequency grid; and

a separator having an input port and at least one output port, said input port connected to said difference frequency generator, said separator responsive to said odd multiple passing said converted signal to said at least one output port so that said converted signal is separated from said input signal.

Claim 2 (canceled)

Claim 3 (original): The optical signal converter of claim 1 wherein said one-half of said pump frequency is one-half between said two frequencies.

Claim 3.1 (canceled)

Claim 4 (original): The optical signal converter of claim 1 wherein said separator comprises a WDM interleaver device.

Claim 5 (original): The optical signal converter of claim 1 wherein said separator has a second output port, said separator responsive to said odd multiple passing any input signals to said second output port.

Claim 6 (currently amended): The optical signal converter of claim 1 wherein said **[[multiple state]]** separator comprises an optical interferometric device.

Claim 7 (original): The optical signal converter of claim 6 wherein said optical interferometric device comprises a Mach-Zehnder interferometer.

Claim 8 (original): The optical signal converter of claim 6 wherein said optical interferometric device comprises an array waveguide grating.

Claim 9 (currently amended): The optical signal converter of claim 6 wherein said optical interferometric device comprises a Fabry-Perot interferometer.[.]

Claim 10 (original): The optical signal converter of claim 6 wherein said optical interferometric device comprises a crystal-based Fourier filter device.

Claim 11 (currently amended): The optical signal converter of claim 1 wherein said difference frequency generator receives a plurality of input ~~signal~~ signals at a plurality of first frequencies and generating a plurality of converted signals at a plurality of second frequencies from said input ~~signal~~ signals and said pump signal, said pump signal at a frequency such that said pluralities of first and second frequencies are separated by an odd multiple of said predetermined amount; and wherein said separator responsive to said odd multiple passes said plurality of converted signals to a first output port and passes any input signals to a second output port so that said converted signals are separated from said input signals.

Claim 12 (original): The optical signal converter of claim 1 wherein said difference frequency generator receives a plurality of energizing pump signals and generating a plurality of converted signals at a plurality of second frequencies from said input signal, said pump signals at frequencies such that said first and second frequencies are separated by odd multiples of said predetermined amount; and wherein said separator responsive to said odd multiples passes said plurality of converted signals to a first output port and passes any input signals to a second output port so that said converted signals are separated from said input signals.

Claim 13 (currently amended): An optical signal converter for converting a plurality of input signals at a plurality of first frequencies to a plurality of signals at a plurality of second

frequencies, said first and second frequencies within a frequency grid, each adjacent pair of frequencies in said frequency grid separated by a predetermined amount, said optical signal converter comprising

a separator having an input port and a plurality of output ports, said separator receiving said input signals at said input port and passing said input signals to said output ports according to locations of said first frequencies of said input signals in said frequency grid;

a plurality of difference frequency generators, each difference frequency generator connected to an output port of said **[[first]]** separator and receiving an energizing pump signal and at least one input signal at one of said first frequencies and generating a converted signal at one of said second frequencies from said input signal and said pump signal, said pump signal at a frequency such that said one of said first frequencies and said one of said second frequencies are separated by an odd multiple of said predetermined amount; and

a combiner having a plurality of input ports and an output port, each input port connected to one of said difference frequency generators, said combiner responsive to said odd multiple to pass said converted signal from each difference frequency generator to said output port and to reject any input signals so that said converted signal is separated from said input signal from each difference frequency generator at said output port.

Claim 14 (original): The optical signal converter of claim 13 wherein said input signals are at said input port of said separator simultaneously.

Claim 15 (original): The optical signal converter of claim 13 wherein said input signals are at said input port of said separator sequentially.

Claim 16 (original): The optical signal converter of claim 13 wherein first frequencies of said input signals are located by multiples of said predetermined amount from an arbitrary reference frequency in said frequency grid and said separator passes said input signals to said output ports according to the evenness or oddness of said multiples.

Claim 17 (original): The optical signal converter of claim 16 wherein each difference frequency generator converts said at least one input signal to a signal at one of said second frequencies of opposite evenness or oddness of said multiple of said one of said first frequencies of said at least one input signal.

Claim 18 (original): The optical signal converter of claim 17 wherein said combiner comprises a device the same as said separator except having a reverse connection.

Claim 19 (currently amended): An optical signal converter for converting a plurality of input signals at a plurality of first frequencies to a plurality of signals at a plurality of second frequencies, said first and second frequencies within a frequency grid, each adjacent pair of frequencies in said frequency grid separated by a predetermined amount, said optical signal converter comprising

a first separator having an input port and a plurality of output ports, said first separator receiving said input signals at said input port and passing said input signals to said output ports according to locations of said first frequencies of said input signals in said frequency grid;

a plurality of difference frequency generators, each difference frequency generator connected to an output port of said first separator and receiving an energizing pump signal and at least one input signal at one of said first frequencies and generating a converted signal at one of said second frequencies from said input signal and said pump signal, said pump signal at a frequency such that said one of said first frequencies and said one of said second frequencies are separated by an odd multiple of said predetermined amount;

a plurality of second separators, each second separator having an input port and at least one output port, said input port connected to one of said difference frequency generators, each ~~[[said]]~~ second separator responsive to said odd multiple to pass said converted signal to said at least one output port so that said converted signal is separated from said input signal at said output port; and

a combiner having a plurality of input ports and an output port, each input port connected to one of said at least one output ports of said ~~[[difference frequency generators]]~~ plurality of second separators, said combiner passing said converted signals at said plurality of input ports to said output port.

Claim 20 (original): The optical signal converter of claim 19 wherein said input signals are at said input port of said first separator simultaneously.

Claim 21 (original): The optical signal converter of claim 19 wherein said input signals are at said input port of said first separator sequentially.

Claim 22 (currently amended): The optical signal converter of claim 19 wherein first frequencies of said input signals are located by multiples of said predetermined amount from an arbitrary reference frequency in said frequency grid and said first separator passes said input signals to said output ports according to the evenness or oddness of said multiples.

Claim 23 (original): The optical signal converter of claim 22 wherein each difference frequency generator converts said at least one input signal to a signal at one of said second frequencies of opposite evenness or oddness of said multiple of said one of said first frequencies of said at least one input signal.

Claim 24 (original): The optical signal converter of claim 19 wherein said combiner comprises a device the same as said first separator except having a reverse connection.

Claim 25 (currently amended). An optical signal converter for converting signals at one frequency to signals at another frequency within a frequency grid, each adjacent pair of frequencies in said frequency grid separated by a predetermined amount, said optical signal converter comprising

a difference frequency generator receiving an energizing pump signal at a pump frequency and an input signal at a first frequency and generating a converted signal at a second frequency from said input signal and said pump signal, wherein one-half of said pump frequency is between two frequencies of said frequency grid.

Claim 26 (canceled)

Claim 27 (currently amended): The optical signal converter of claim ~~[[26]]~~ 25 wherein said one-half of said pump frequency is one-quarter between said two frequencies of said frequency grid.

Claim 28 (currently amended): The optical signal converter of claim 25 including a separator, said separator having at least one input port and at least one output port, said input port connected to said difference frequency generator~~[[,]]~~.

Claim 29 (original): The optical signal converter of claim 28 wherein said separator is responsive to an odd multiple of one half of said predetermined amount of said frequency grid so that said converted signal is separated from said input signal.

Claim 30 (original): The optical signal converter of claim 25 wherein said converted signal is shifted from said frequency grid by one half of said predetermined amount.

Claim 31 (original): The optical signal converter of claim 28 wherein said separator comprises a WDM interleaver device.

Claim 32 (original): The optical signal converter of claim 25 including a combiner having at least one input port and at least one output port, said input port connected to said difference frequency generator, said combiner passing said converted signal at said input port to said output port.

Claim 33 (original): The optical signal converter of claim 32 wherein said combiner is responsive to an odd multiple of one half of said predetermined amount of said frequency grid so that said converted signal is separated from said input signal.

Claim 34 (original): The optical signal converter of claim 32 wherein said combiner comprises a WDM interleaver device.

Claim 35 (original): The optical signal converter of claim 28 wherein said separator comprises an optical interferometric device.

Claim 36 (original): The optical signal converter of claim 35 wherein said optical interferometric device comprises a Mach-Zehnder interferometer.

Claim 37 (original): The optical signal converter of claim 35 wherein said optical interferometric device comprises an array waveguide grating.

Claim 38 (original): The optical signal converter of claim 35 wherein said optical interferometric device comprises a Fabry-Perot interferometer.

Claim 39 (original): The optical signal converter of claim 35 wherein said optical interferometric device comprises a crystal-based Fourier filter device.

Claim 40 (original): The optical signal converter of claim 32 wherein said combiner comprises an optical interferometric device.

Claim 41 (original): The optical signal converter of claim 40 wherein said optical interferometric device comprises a Mach-Zehnder interferometer.

Claim 42 (original): The optical signal converter of claim 40 wherein said optical interferometric device comprises an array waveguide grating.

Claim 43 (original): The optical signal converter of claim 40 wherein said optical interferometric device comprises a Fabry-Perot interferometer.

Claim 44 (original): The optical signal converter of claim 40 wherein said optical interferometric device comprises a crystal-based Fourier filter device.

Claim 45 (currently amended). An optical signal converter and combiner for converting signals at a first set of frequencies located on a first frequency grid to signals at a second set of frequencies located on a second frequency grid, each adjacent pair of frequencies in said first frequency grid and said second frequency grid separated by a predetermined amount, and said second ~~[[frequency]]~~ frequency grid shifted from said first frequency grid by one half of said predetermined amount, said optical signal converter and combiner comprising

a difference frequency generator receiving an energizing pump signal at a pump frequency and a first input signal at said first set of frequencies and generating a converted signal at said second set of frequencies from said first input signal and said pump signal, wherein one-half of said pump frequency is one-quarter between two frequencies of said first frequency grid; and

a combiner having a plurality of input ports and at least one output port, wherein a first input port is connected to said difference frequency generator, said combiner passing said ~~said~~ second set of frequencies at said first input port to said output port.

Claim 46. The optical signal converter and combiner of claim 45 including

a third signal at a third set of frequencies on said first frequency grid;  
wherein said third set of frequencies are connected to a second input port of said combiner; wherein said third set of frequencies is combined with said second set of frequencies at said output port of said combiner.

Claim 47 (new): The optical signal converter of claim 1 wherein said one-half of said pump frequency is one-quarter between said two frequencies.